

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Cancelled)

2. (Cancelled)

3. (Currently Amended) ~~[[The]]~~ An object detection apparatus ~~according to claim 1, further for detecting a target object in an image, comprising:~~
a template memory portion for memorizing a template consisting of one or more open curves indicating a part of a contour of a model of the object or a part of the model;
an image input portion for entering an image to be detected;
a detection portion for detecting the object in the entered image by calculating a matching degree of the entered image with the template;
an edge image generation portion for generating an edge image of the entered image;
an overlapping portion for overlapping the generated edge image with the template;
and
a count portion for counting the number of times of overlapping of the template with the one or more open curves for each pixel in the edge image when the overlapping portion performed the overlapping process for each pixel on an edge of the edge image, wherein
the template memory portion has a template that is made of one or more open curves indicating a part of a contour of a model of the object or a part of the model and a point indicating a predetermined position of the model, and is made by rotating the one or more open curves around the point by a half-turn,
the overlapping portion overlaps the edge image with the template so that a pixel on the edge of the edge image matches the point of the template, and
the detection portion detects the object by calculating the matching degree in accordance with the number of times counted by the count portion.

4. (Currently Amended) ~~[[The]]~~ An object detection apparatus ~~according to claim 1, further~~ for detecting a target object in an image, comprising:
a template memory portion for memorizing a template consisting of one or more open curves indicating a part of a contour of a model of the object or a part of the model;
an image input portion for entering an image to be detected;
a detection portion for detecting the object in the entered image by calculating a matching degree of the entered image with the template;
a brightness image generation portion for generating a brightness image of the entered image; and
an average brightness calculation portion for calculating an average brightness of an image area of the generated brightness image, wherein
the template memory portion memorizes a template consisting of one or more open curves indicating a part of a contour of a model of the object or a part of the model and a plurality of areas sandwiching the one or more open curves,
the average brightness calculation portion calculates an average brightness of each image area of the brightness image overlapping the plural areas of the template when overlapping the template with each position of the generated brightness image, and
the detection portion detects the object by calculating the matching degree in accordance with the average brightness of each of the image areas of the brightness image that was calculated by the average brightness calculation portion.

5. (Cancelled)

6. (Cancelled)

7. (Cancelled)

8. (Cancelled)

9. (Currently Amended) ~~[[The]]~~ An object detection method ~~according to claim 7, further for detecting a target object in an image, comprising:~~
a step for entering an image to be detected;
a step for detecting the object in the entered image by calculating a matching degree of the entered image with a template consisting of one or more open curves indicating a part of a contour of a model of the object or a part of the model;
a step for generating an edge image of the entered image;
a step for overlapping the generated edge image with the template; and
a step for counting the number of times of overlapping of the template with the one or more open curves for each pixel in the edge image when performing the overlapping process for each pixel on an edge of the edge image, wherein
the template is a template that is made of one or more open curves indicating a part of a contour of a model of the object or a part of the model and a point indicating a predetermined position of the model, and is made by rotating the one or more open curves around the point by a half-turn,
the step for overlapping includes overlapping the edge image with the template so that a pixel on the edge of the edge image matches the point of the template, and
the step for detecting includes detecting the object by calculating the matching degree in accordance with the number of times counted in the step for counting.

10. (Currently Amended) ~~[[The]]~~ An object detection method ~~according to claim 7, further for detecting a target object in an image, comprising:~~
a step for entering an image to be detected;
a step for detecting the object in the entered image by calculating a matching degree of the entered image with a template consisting of one or more open curves indicating a part of a contour of a model of the object or a part of the model;
a step for generating a brightness image of the entered image; and
a step for calculating an average brightness in an image area of the generated brightness image, wherein

the template is a template that is made of one or more open curves indicating a part of a contour of a model of the object or a part of the model and a plurality of areas sandwiching the one or more open curves,

the step for calculating an average brightness includes calculating an average brightness of each image area of the brightness image overlapping the plural areas of the template when overlapping the template with each position of the generated brightness image, and

the step for detecting includes detecting the object by calculating the matching degree in accordance with the calculated average brightness of each of the image areas of the brightness image.

11. (Cancelled)

12. (Cancelled)

13. (Cancelled)

14. (Cancelled)

15. (Cancelled)

16. (Currently Amended) A monitoring system, comprising:
a video camera for taking an image; and
an object detection apparatus for detecting a target object in the image taken by the video camera, wherein
the object detection apparatus includes:
a template memory portion for memorizing a template consisting one or more open curves indicating a part of a contour of a model of the object or a part of the model, and
a detection portion for detecting the object in the image by calculating a matching degree of the image taken by the video camera with the template;
an edge image generation portion for generating an edge image of the image;

an overlapping portion for overlapping the generated edge image with the template; and

a count portion for counting the number of times of overlapping of the template with the one or more open curves for each pixel in the edge image when the overlapping portion performed the overlapping process for each pixel on an edge of the edge image, wherein

the template memory portion has a template that is made of one or more open curves indicating a part of a contour of a model of the object or a part of the model and a point indicating a predetermined position of the model, and is made by rotating the one or more open curves around the point by a half-turn,

the overlapping portion overlaps the edge image with the template so that a pixel on the edge of the edge image matches the point of the template, and

the detection portion detects the object by calculating the matching degree in accordance with the number of times counted by the count portion.

17. (Original) The monitoring system according to claim 16, further comprising:
an image display device for displaying an enlarged image area of the object detected by the object detection apparatus among the image taken by the video camera.

18. (Original) The monitoring system according to claim 16, further comprising:
a recording device for recording an image taken by the video camera when the object is detected in the image.

19. (Original) The monitoring system according to claim 16, wherein
the object is a person, and
the open curve constituting the template is a contour of an upper half of a human head.

20. (Original) The monitoring system according to claim 16, wherein
the object is a person, and
the open curves constituting the template are contours of human shoulders.

21. (New) The object detection apparatus according to claim 3, wherein the object is a person, and the open curve constituting the template is a contour of an upper half of a human head.

22. (New) The object detection apparatus according to claim 3, wherein the object is a person, and the open curves constituting the template are contours of human shoulders.

23. (New) The object detection apparatus according to claim 4, wherein the object is a person, and the open curve constituting the template is a contour of an upper half of a human head.

24. (New) The object detection apparatus according to claim 4, wherein the object is a person, and the open curves constituting the template are contours of human shoulders.

25. (New) The object detection method according to claim 9, wherein the object is a person, and the open curve constituting the template is a contour of an upper half of a human head.

26. (New) The object detection method according to claim 9, wherein the object is a person, and the open curves constituting the template are contours of human shoulders.

27. (New) The object detection method according to claim 10, wherein the object is a person, and the open curve constituting the template is a contour of an upper half of a human head.

Application No. 10/777,363
Amendment dated August 3, 2007
Reply to Office Action of May 3, 2007

28. (New) The object detection method according to claim 10, wherein
the object is a person, and
the open curves constituting the template are contours of human shoulders.